Case 14127
Internal herniation with bowel ischemia after Roux-en-Y gastric bypass surgery.

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Section: Abdominal Imaging
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Patient: 71 year(s), male

Clinical History

A 71-year-old male presented with acute abdominal pain, severe bloating and constipation. The patient underwent a laparoscopic Roux-en-Y gastric bypass (RYGB) 20 years previously. Clinical examination showed diffuse abdominal tenderness and dull abdominal percussion. Blood samples showed a slightly elevated lactate of 1, 65 mmol/L (0, 5-1, 6 mm/L) with normal inflammatory parameters.

Imaging Findings

An upright abdominal radiograph showed overall decrease of bowel air with few air-fluid levels in the epigastrium and right hemiabdomen(Fig 1). A subsequent contrast enhanced computed tomography (CE CT) of the abdomen was performed.
The images showed a diffuse enlargement of small bowel loops filled with fluid, diffuse haziness of the surrounding fat (Fig 2 and 3) and free abdominal fluid. Some bowel loops showed a thin wall with decreased contrast enhancement compared to other loops, suggestive of bowel ischemia (Fig 2). There was no free air. Axial images showed a mushroom configuration of the bowel loops and adjacent mesentery (Fig 4) whereas coronal images showed a swirled mesentery (Fig 5).

The diagnosis of internal herniation (IH) with bowel ischemia was made. Emergency surgery confirmed a transmesocolic internal herniation with abdominal obstruction and reversible bowel ischemia. Reduction was successful.

Discussion

The RYGB is the most common bariatric procedure and consists of three steps: creation of a small stomach pouch, reconstruction of a new gastrojejunal anastomosis between the stomach pouch and the jejunum (Roux limb) and construction of a jejunojejunostomy (biliopancreatic limb). This altered anatomy creates intermesenteric spaces through which the small bowel may herniate and cause bowel ischemia and even death. IH has a reported prevalence of up to 14% and is more common after laparoscopic RYGB because of less adhesion formation, compared to open surgery [1, 2]. There are two intermesenteric spaces where IH may occur (Fig 6): at the jejunojejunostomy between the biliopancreatic and Roux limb (jejunojejuno mesenteric space) and between the Roux limb and the transverse mesocolon (Peterson space). An additional site for IH, only in case of retrocolic placement of the Roux limb, is in the transverse mesocolon through which the Roux limb passes. It has been reported that antecolic placement of the Roux limb and perioperative closure of the mesenteric and Peterson spaces may reduce the risk of IH [3].

Clinical signs and symptoms of internal herniation are nonspecific. The most common symptoms are nausea, vomiting, abdominal pain, and abdominal distention.

Abdominal radiography is nonspecific and may show dilated small bowel with air-fluid levels and crowding in abnormal location. CT is considered to be the gold standard for the correct diagnosis of IH. Multiphasic CT is advisable. Non-enhanced images may show hemorrhagic bowel congestion and hyperattenuation of the bowel wall. The arterial phase allows the evaluation of the mesenteric arteries. The portal venous phase is the most valuable for the evaluation of the bowel wall and the mesenteric vessels.

Administration of oral contrast is controversial and should not be used in routine. Oral contrast may hide spontaneous bowel wall hyperdensity and reduces the accuracy of bowel wall enhancement. Lockhart et al. investigated the sensitivity and specificity of seven CT signs of internal herniation: swirled mesentery, mushroom, hurricane eye, small-bowel obstruction, clustered loops, small-bowel behind superior mesenteric artery, right-sided anastomosis and overall impression ". Swirled mesentery is the best predictor of IH with a sensitivity of 61-83% and specificity of 67-94% [4] [5].

The treatment of IH after RYGB consists of reduction of the herniated small bowel and closure of both intermesenteric spaces. In case of irreversible ischemia, a part of the small bowel has to be resected. Most often IH is treated laparoscopically.

Final Diagnosis

Internal herniation with bowel ischemia

Differential Diagnosis List

Obstruction due to intestinal adhesions , Obstruction due to malignancy, Volvulus

Figures

Figure 1 Upright abdominal radiograph

Upright abdominal radiograph shows a diffuse absence of bowel air with a few air-fluid levels epigastric, peri-umbilical and in the right abdominal region

Area of Interest: Abdomen;
Imaging Technique: Conventional radiography;
Procedure: Diagnostic procedure;
Special Focus: Obstruction / Occlusion;

Figure 2 CE CT of the abdomen

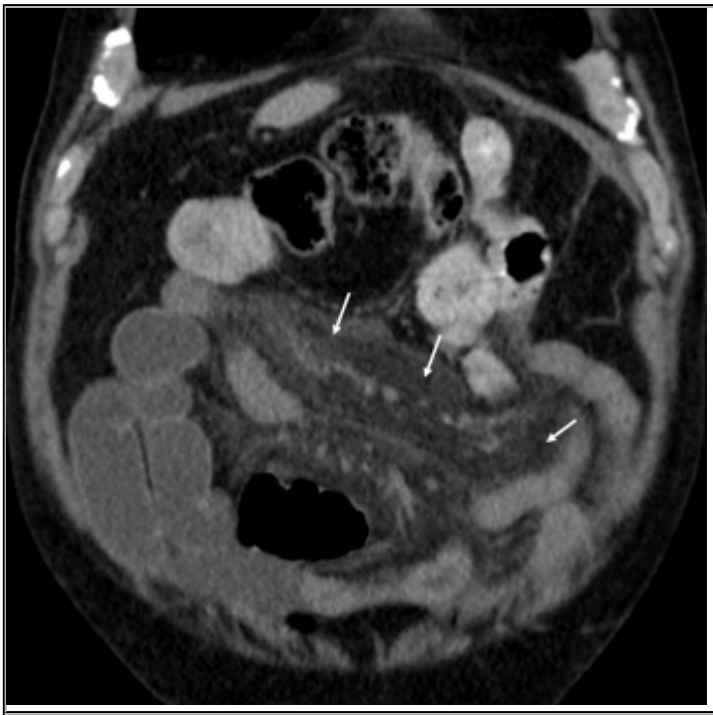
Axial CE CT of the abdomen shows enlarged small bowel loops with thin walls and decreased contrast enhancement (white arrows) compared to normal loops (blue arrows). Note the free paracolic fluid on both sides.

Area of Interest: Abdomen;
Imaging Technique: Conventional radiography;
Procedure: Diagnostic procedure;
Special Focus: Obstruction / Occlusion;

Axial CE CT of the abdomen shows enlarged small bowel loops with thin walls and decreased contrast enhancement (white arrows) compared to normal loops (blue arrows). Note the free paracolic fluid on both sides.

Area of Interest: Abdomen;
Imaging Technique: CT;
Procedure: Diagnostic procedure;
Special Focus: Ischaemia / Infarction;

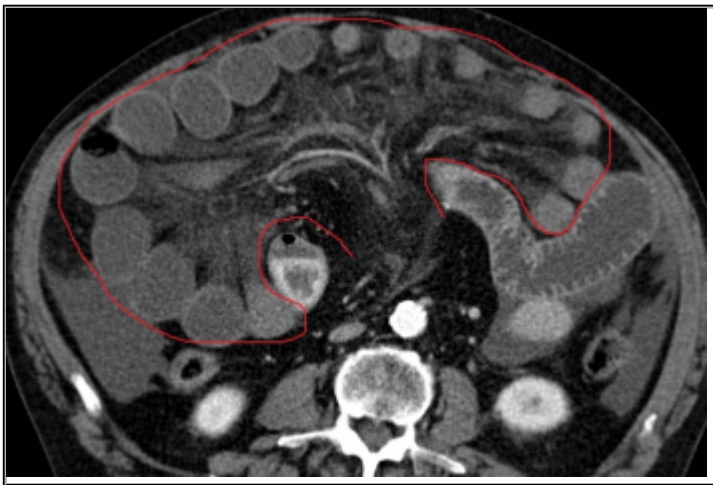
Figure 3 CE CT of the abdomen



Coronal CE CT of the abdomen shows a diffuse haziness of the herniated mesentery (arrows)

Area of Interest: Abdomen;
Imaging Technique: CT;
Procedure: Diagnostic procedure;
Special Focus: Obstruction / Occlusion;

Figure 4 CE CT of the abdomen



Axial CE CT of the abdomen shows the mushroom sign (red line).

Area of Interest: Abdomen;
Imaging Technique: CT;
Procedure: Diagnostic procedure;
Special Focus: Obstruction / Occlusion;

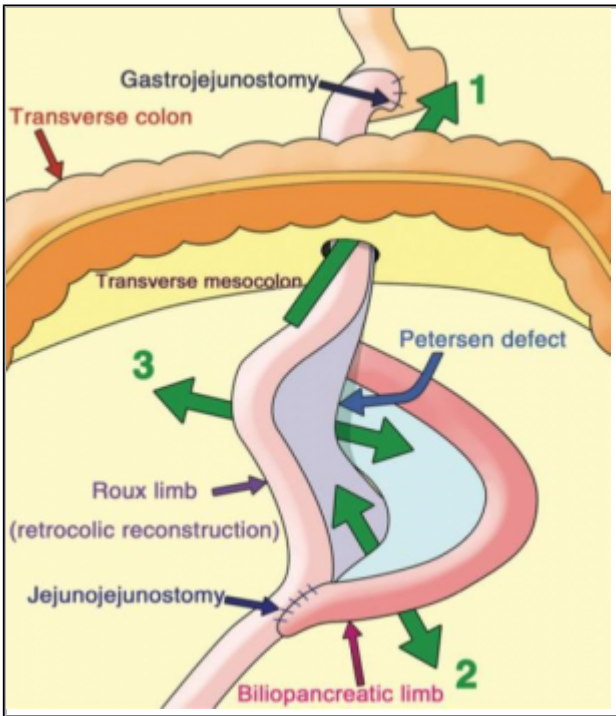
Figure 5 CE CT of the abdomen

Coronal CE CT of the abdomen shows a swirled mesentery (arrow).

Area of Interest: Abdomen;

Imaging Technique: CT;
Procedure: Diagnostic procedure;
Special Focus: Obstruction / Occlusion;

Figure 6 Illustration



The different intermesenteric internal herniation sites after Roux-en-Y gastric bypass surgery : 1 = transmesocolic hernia, 2 = jejunojejunostomy mesenteric hernia, 3 = Petersen hernia [4].

Area of Interest: Abdomen;
Imaging Technique: Experimental;
Procedure: Complications;
Special Focus: Obstruction / Occlusion;

References

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Citation

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